



Transmig 350i

Transmatic 4x4P

Welding Package

SERVICE MANUAL

TRANSMIG 350i - OPERATION

POWER SIDE

The AC input is applied via rotary switch S1, when the machine is switched on the AC between phases A and B is connected to Control Transformer T2. The secondaries on T2 provide the following:

1. 42Vac - Wire Feeder
2. 36Vac - Centre Tapped - Control PCB
3. 24Vac - J2 Remote Contactor

With switch S1 closed the 3 phase AC is applied to rectifier IBR which produces a DC voltage at its output terminals.

The positive DC voltage is connected to resistor R1 and thyristor SCR1. R1 limits the amount of inrush current into the capacitors C1 and C5 upon power up. SCR1 bypasses R1 when the machine is processing power.

With the machine connected for 420V input there will always be a minimum DC voltage across capacitors C1 & C5 of 594Vdc ($V_{in} \times 1.414$) this giving 297Vdc across each individual capacitor. Since there is 297Vdc across capacitors C1 & C5, there must be 148.5Vdc across capacitors C2, C3, C6 & C7. Resistors R2, R3, R6 & R7 force these voltages across the capacitors and act as bleeder resistors when the unit is turned off. The maximum voltage across main transformer T1 is then 148.5Vdc.

There are two primary windings on T1, 11 turns each and two secondaries, 5 turns each. C4 & R4 act as a snubber across one primary winding and C8 & R8 form a snubber across the other primary winding.

The firing sequence on IGBT1 & TGBT2 are such that the top of IGBT1 and the top of IGBT2 turn on at the same time (bottom of IGBT1 and bottom of IGBT2 are off). The bottom of IGBT1 and the bottom IGBT2 turn on at the same time (the top of IGBT1 and top of IGBT2 are off). This sequence makes the two primaries of T1 to be in parallel since the voltage across them is equal and the primary windings are not physically connected. Since the turns ratio is 11 to 5 on T1, if the output current was 300 amps, each primary winding would see 68.2 amps. Primary current through the IGBT's is sensed through current transformers T3 & T4. The turns ratios are 1 to 100 so the maximum current on the secondary of the transformers would be 682 Milliamps.

The secondary of T1 is a centre tap configuration. Output diodes OBR1, OBR2 & OBR3 rectify the voltage from the transformer and the positive voltage is applied to the inductor L1 for current smoothing. C9 & R9 act as a snubber across the diode network, C10 & R10 act as a snubber across the other diode network.

The output current is sensed by the hall effect device which produces a 1V output per 100A input. Capacitors C11 & C12 act as noise suppressers from high frequency generators (TIG machines) and also provide filtering for the output of the power supply.

Fans M1 & M2 are controlled by the solid state relay K1. The relay engages when the contactor circuit is on and remains on for a minimum of four minutes after the contactor circuit is de-energised.

J1 is the wire feeder connector and J2 is the connector for the remote hand control.

J1 is also the connector for the Ultrapulse Unit, when this is connected the Wire Feeder is plugged into the connector on the Ultrapulse.

R11 is the voltage/current control potentiometer, R12 is the inductance/arc force potentiometer. S2 is the slope selector switch, S3 is the process control switch, S4 is the panel/remote control switch, S5 is the volts/amps meter selection switch, S6 is the local/remote contactor switch. PL1 is the mains on inductor lamp, PL2 is the voltage high/low indicator lamp, PL3 is the overtemperature indicator lamp.

PRINTED CIRCUIT BOARD - PCB1

This PCB located in the top of the machine process all the signals from the relevant controls and fires the IGBT's accordingly.

Go signals from either the contactor switch on either the front panel, HC-5 remote Control or Feed Unit are applied to a contactor control circuit. This removes the inhibit signals and sends a signal to the driver circuit. It also sends a signal to the fan driver circuit.

The magnitude of this signal is dependant on potentiometers which again are either located on the machine front panel, HC-5 or Feed Unit. These potentiometers carry out more than one function ie. voltage or current and inductance or arc force, the function they perform being dependant on the mode selected ie. MIG, MMA or TIG.

This PCB incorporates the following circuits which will not be explained in detail:

Power Supplies	Local/Remote Sensing
Current Amplifier	Characteristic Amplifier
Inductance/Arc Force	Fault Circuit
Contactors Circuit	Over/Under Volts
Current Feedback	Voltage Feedback
Temperature Sensing	Over Current
Volt/Amps - for Digital Meters	

18V-0-18Vac is supplied from T2 to P7-10, P7-9, P7-8 which is fed into the power supply circuit providing DC voltages at the following test points with respect to 0 volt on the PCB.

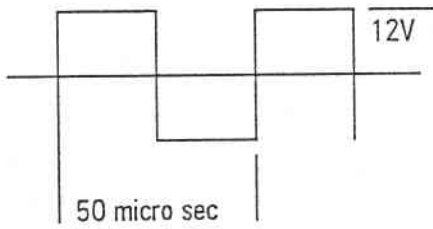
TP13	=	OV
TP12	=	+15V
TP14	=	-15V

DC voltages are also available at the following PCB EDGE CONNECTIONS:

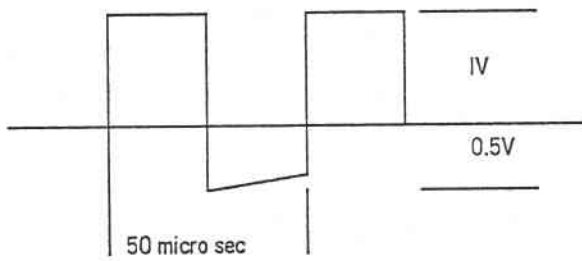
P4-13	=	+15V
P4-2	=	+10V
P5-10	=	+5V
P4-12	=	OV
P9-1 to P9-2	=	+8V (input into K1 - when contactor circuit closed)
P4-13 to P4-14	=	+12V at switch on
P4-13 to P4-15	=	+12V at fault condition
P4-13 to P4-16	=	+12V at fault condition
P4-2 to P4-12	=	+10V supplying local voltage/current control
P4-1 to P4-12	=	0 to + OV ref local voltage/current control
P8-1 to P8-3	=	+15V supply to remote voltage control feed unit
P8-4 to P8-3	=	0 to + 10V ref from remote voltage control.
P6-4 to P7-1	=	+10V supply to remote current control
P6-3 to P7-1	=	0 to 10V supply from remote current control

WAVEFORMS

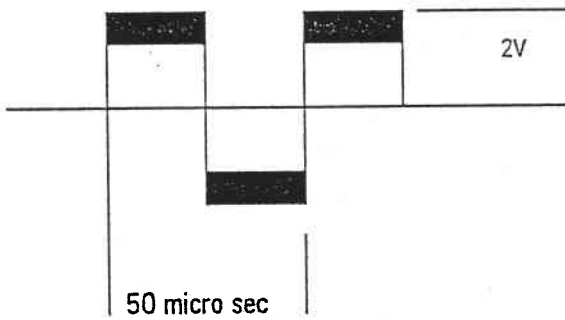
PIB-1 to PIB-4 output to IGBT Driver Circuit



PIA-1 to PIA-4 Drive Signal to SCR1

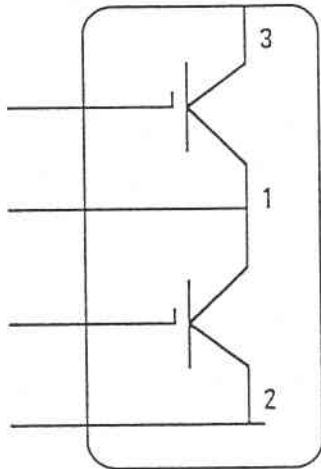


Individual IGBT Signals 1-2: 3-4 etc

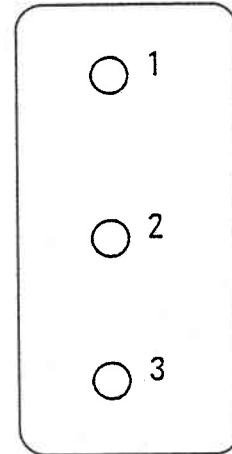


Voltage Across IGBT Output Terminals using Scope

As shown on Circuit Diagram



Actual in Machine



Contactor Circuit Off

Scope clip on 1 probe on 3
Scope clip on 1 probe on 2

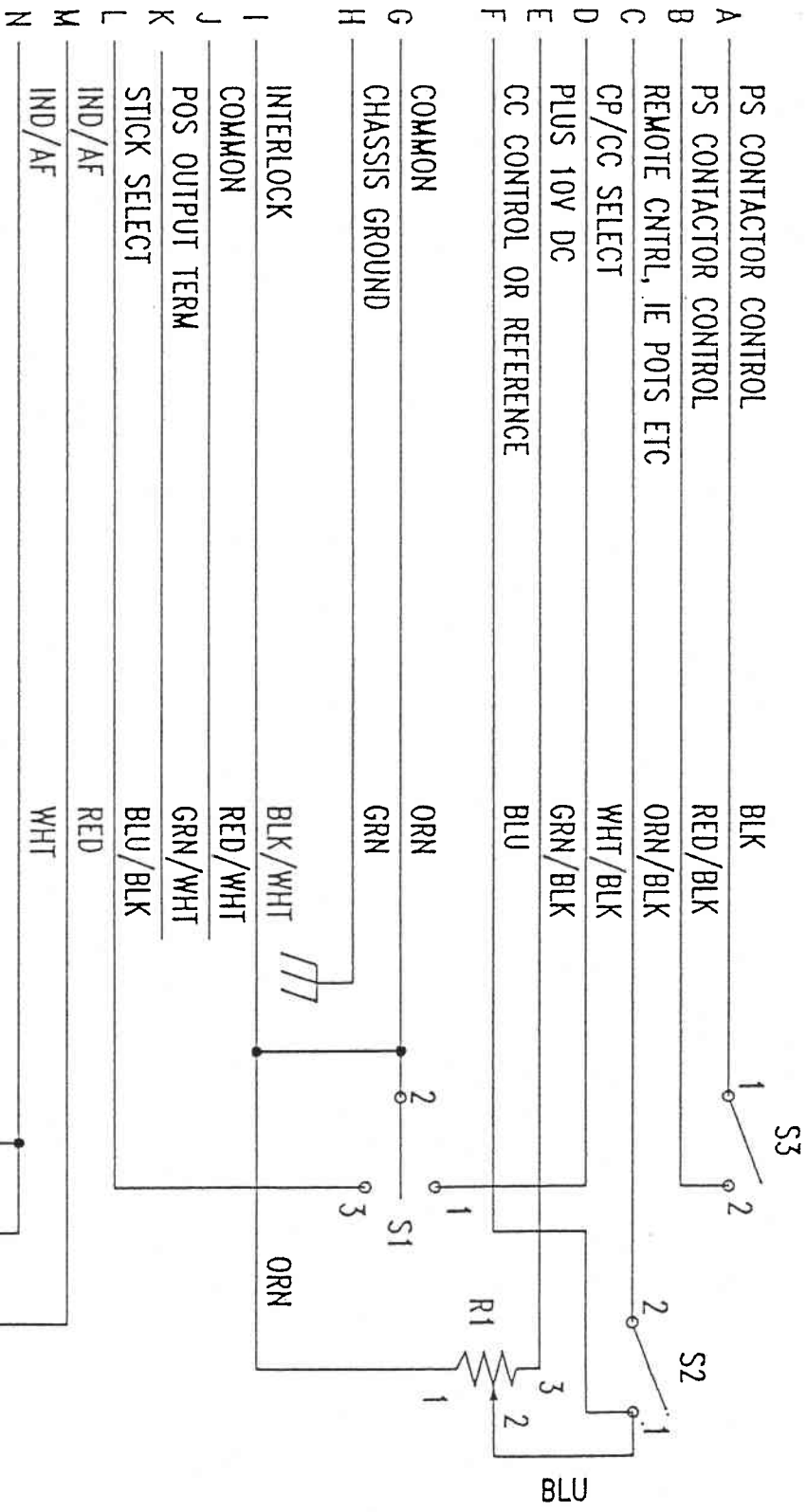
see + 150Vdc
see - 150Vdc

Contactor Circuit On

Scope clip on 1 probe on 3
OV to + 300V squarewave at 50 μ sec

Scope clip on 1 probe on 2
OV to - 300V squarewave at 50 μ sec

POWER SOURCE



- S3 - Contactor ON/OFF
- S2 - Standard/Digimig Wire Feeder
- S1 - Process Switch
- R1 - Volts or Amps Control
- R2 - Inductance or Arc Force Control

HC-5 REMOTE CONTROL